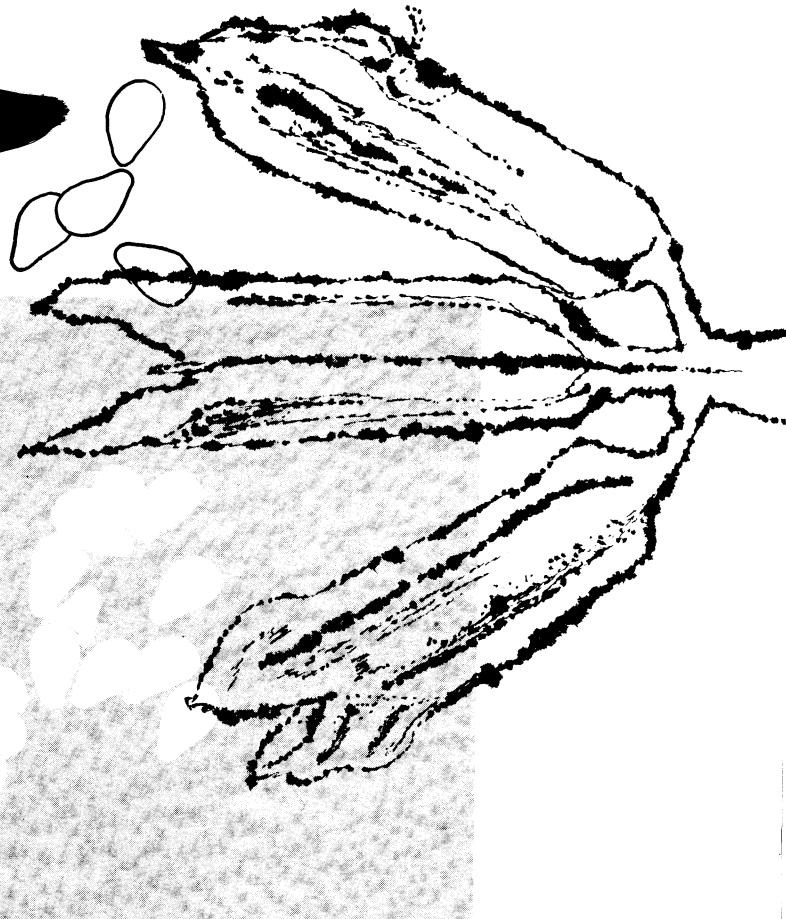


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sesame PRODUCTION

Farmers' Bulletin No. 2119

U. S. Department of Agriculture

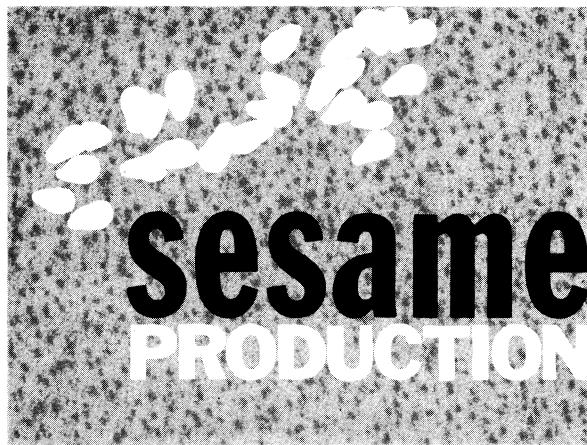
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Prepared by Crops Research Division, Agricultural Research Service

Sesame¹ is a promising new crop for farmers in the southern half of the United States. It is especially promising for farmers who operate under acreage restrictions on basic crops.

Sesame can be grown, generally, wherever cotton can be grown, and it yields approximately the same amount of seed per acre.

Because of its high oil content—about 50 percent—the seed is worth more to oilseed producers than any other edible oilseed.

Marketable sesame products are the whole seed, the oil, and the meal. The whole seed is used in making a variety of breads, cakes, and candies. The oil, pressed from the seeds, is used as salad or cooking oil, and in making shortening, margarine, cosmetics, medicines, and insecticides. The meal, left after the pressing operation, is a good feed for cattle and poultry. The stalks are often plowed under as a source of organic matter.

The crop has been grown for centuries in Asia and Africa, mostly on small farms. It is produced on a large scale in Latin America.

In the United States, sesame has been produced commercially only since 1950. Previously it was grown mostly as a garden crop in southeastern States under the name "benne."

Domestic production has been increasing since World War II. Farmers in Texas, New Mexico, and California planted about 15,000 acres in 1957 and harvested about 9 million pounds of seed. Present demand from the whole-seed market alone would absorb production from an additional 15,000 acres. This demand is increasing each year.

When complete mechanization helps sesame seed compete economically on the oilseed market, much larger acreages are expected.

Expanding market facilities, newly announced improved varieties, and greater demand should

¹ *Sesamum indicum* L.

make sesame a worthwhile crop for farmers in the South and Southwest.

VARIETIES

Sesame varieties are classified as either shattering or nonshattering. The seed capsules of the shattering types open when they become dry; capsules of the nonshattering types remain closed.

At present most domestic sesame is sold on the whole-seed market. The cost of harvesting sesame is still too high for selling at competitive prices on the oilseed market.

Large acreage production, however, made possible by machine harvesting of the new nonshattering varieties, is expected to enable sesame to compete on the oilseed market.

Improved varieties are being developed for more disease resistance, better seed quality, greater adapt-

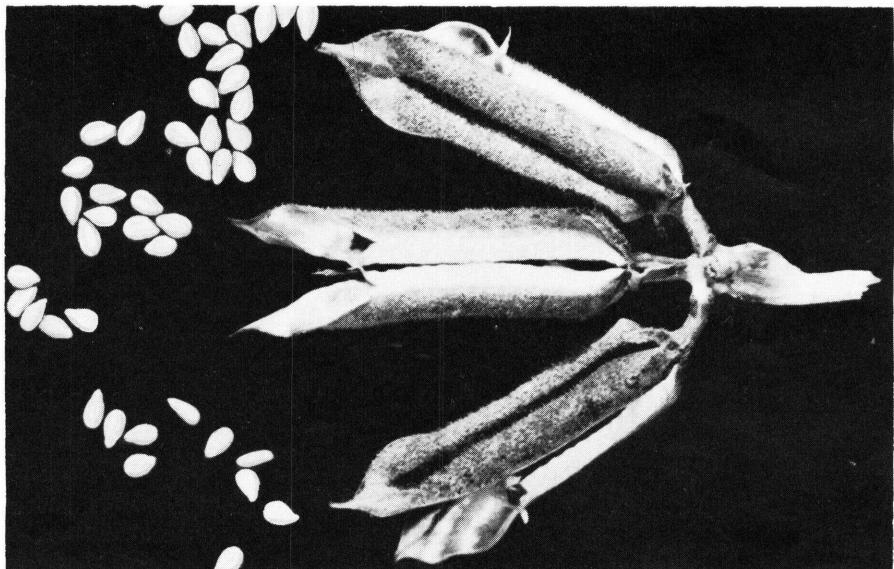
ability to mechanized harvesting, and more specific adaptation to various growing conditions.

Shattering Varieties

Most of the shattering varieties of sesame grown in the United States have been produced from the variety known as Kansas 10 or K 10. This variety grows without branches, and has three seed capsules at the base of every leaf. The seeds of K 10 varieties have a high oil content—some over 50 percent. Their bitter flavor limits their value on the whole-seed market.

Three improved K 10 varieties have been developed: Margo, Blanco, and Dulce. Margo resembles K 10. The chief difference is that Margo is resistant to bacterial leaf spot disease.

The seeds of Blanco are white colored and only slightly bitter flavored. Blanco grows very tall under favorable growing condi-



Shattering sesame seed capsules.

M7293

tions, and its stems may bend over, or "gooseneck," which makes it difficult to harvest.

Dulce is also resistant to bacterial leaf spot, and moderately resistant to other leaf spot diseases. The white color and sweet flavor of Dulce seed should command premium prices on the whole-seed market.

Another shattering variety, Llano, matures earlier than the K 10 varieties. This is an advantage in areas where early frosts are a hazard.

Careful hand labor is necessary in harvesting all shattering varieties to prevent heavy loss of seeds from the open dry capsules.

Nonshattering Varieties

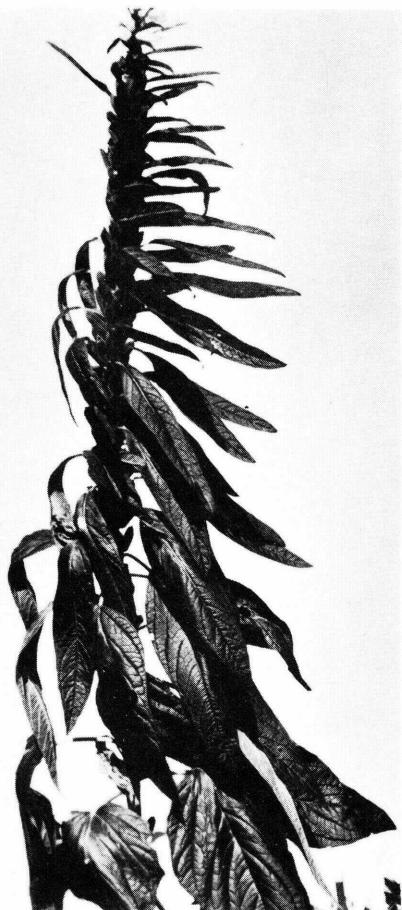
Research has produced 3 varieties of nonshattering sesame: Delco, Rio, and Palmetto. All average slightly less than 50-percent oil content.

Delco, the latest to be announced, is easier to thresh than the others, and can be threshed at lower cylinder speeds. This is an advantage because it results in less seed damage, which in turn means better oil quality. Delco is recommended only for areas with dry fall weather.

Rio and Palmetto have been grown commercially since 1955. They are moderately tall and have no branches. They mature in about 4 months. Rio is recommended for production in the Southwest.

PLANNING THE CROP

Ask your county agent what varieties of sesame are suitable for your soil and climate.



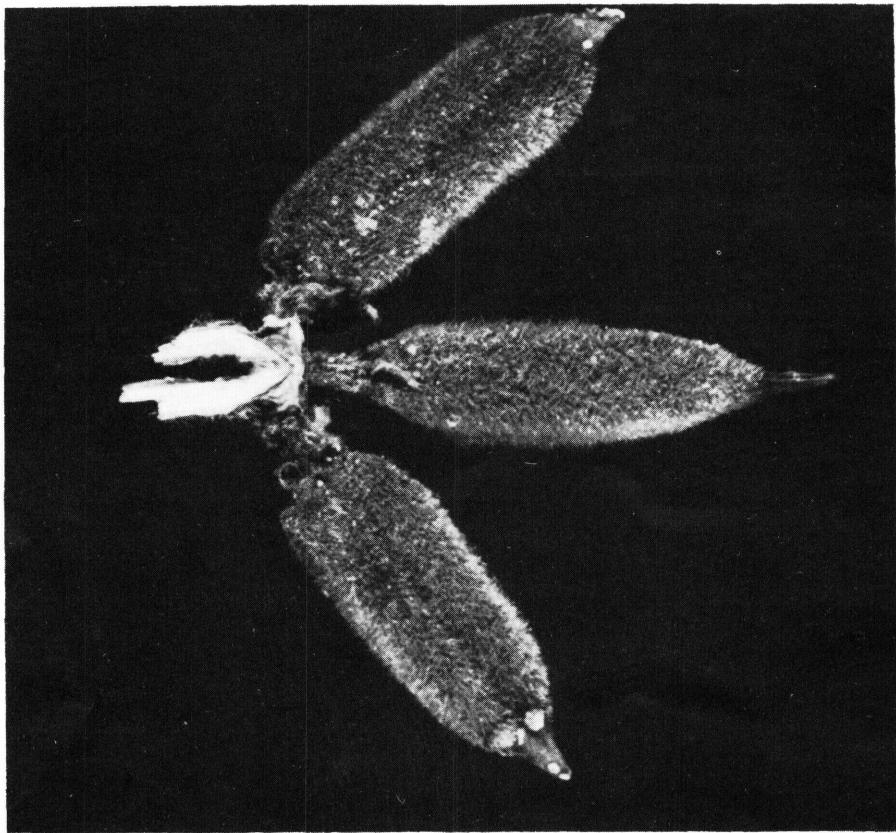
BN 4360

Nonshattering sesame.

Earmark sufficient acreage to grow a cash crop. Small quantities of sesame seed do not attract buyers. Very few individual farmers plant less than 25 acres of sesame on a trial basis.

Locate the equipment you will need for planting, harvesting, mowing, and, if necessary, storing the crop.

Ask your county agent about marketing. Markets and distribution methods have not been established in all areas. Make sure of a market before you plant sesame.



Nonshattering sesame seed capsules.

M7293

Temperature and Growing Season

Sesame performs best where temperature is high throughout the entire growing season. Seed will not germinate when the soil temperature is below about 70° F. Low temperatures retard plant growth even after the stand is established. A hard freeze not only kills the plants but spoils seed quality. Growth and fruiting are favored by average daily temperatures of around 80° F. Very hot weather, with maximum temperatures over 105° F., may result in poor capsule set.

Sesame should be planted at least a month after the last killing frost, and harvested before the first frost in the fall. Plants need a minimum of 5 frost-free months to mature. Production in the North is limited, although satisfactory experimental crops have been grown in Nebraska.

Moisture Requirements

Sesame is drought resistant. Areas with enough rainfall for dryland sorghum or cotton should have enough moisture for sesame.

In dry areas sesame responds to proper irrigation.

Excessive moisture, however, is not beneficial. Extended periods

of rainfall and high humidity will cause leaf diseases. If water stands on a sesame planting for more than a few hours, the crop will be killed by root drowning.

Soil Requirements

Sesame is adaptable to many types of soil, but it thrives best on well-drained, fertile soils of medium texture and neutral reaction. Do not plant in shallow soils with impervious subsoils nor in soil with a high salt concentration.

Sesame is not a soil-building crop, but it does appear to improve soil structure. This is probably due to the loosening effect of the feeder root system.

CULTURAL PRACTICES

Always plant certified pure seed. Mixing shattering and nonshattering sesame, or planting more than one variety, will result in a stand that is difficult to harvest because of plant height and maturity differences. Or, mixing may result in a crop of mixed seed that does not have the uniform size, color, and flavor that command premium prices on the market.

Treat seed with protectant before making germination tests.

Seed Treatment

Clean seed thoroughly. Treat against seed rot with 1 ounce of Orthocide 75 (75% Captan) per 100 pounds of seed.

Seed treatment is especially important for nonshattering varieties because they take longer to emerge than the shattering varieties do, and therefore need more protection from seedling diseases in the soil.

Planting Date

Sesame needs high temperature for germination and growth. Plant as soon as soil temperature has reached 75° F. and all danger of frost has passed. In most areas sesame should be planted 2 or 3 weeks later than cotton.

Seedbed Preparation

Sesame requires a warm, moist, mellow, weed-free seedbed. In humid areas, or in irrigated sections, plant on low beds. In dry areas plant on the level or in shallow furrows. Since sesame is a late planted crop, one or more crops of spring weeds can be killed by shallow cultivation before planting.

On soils of low to moderate fertility, apply a balanced commercial fertilizer before planting. Rate and ratio of fertilizer used should be similar to those recommended for cotton on the same soil.

Planting Equipment

Plant sesame with regular row crop planting equipment. Regular planter hoppers will usually crush sesame seed and cause clogging. If this happens, replace the planter hoppers with vegetable hoppers.

Space in rows 18 to 30 inches apart if suitable planting and cultivating equipment is available. This narrow-row spacing will almost always produce higher yields than normal 36- to 42-inch rows, but if necessary equipment is not available, the wide-row spacing may be used.

Plant sesame about 1 inch deep in light soils and 1½ to 2 inches deep in heavy soils that dry out quickly. Firm the soil over the

seed row by means of a rubber press wheel or similar attachment. Adjust planter to make a stand of plants spaced about 3 inches apart in the row. Stand tolerance is high, however, and plant spacings of 1 to 6 inches apart in the row will usually produce similar yields.

Thin out stands that are heavier than 12 plants per foot for best results.

Plant spacings of more than 6 inches are not recommended.

One pound of sesame seed is usually sufficient to plant 1 acre in standard width rows spaced at about one seed per inch.

Cultivation

Sesame seedlings are small and grow slowly at first, especially in cool weather.

Since young sesame plants do not tolerate much competition from

weeds, it is advisable to plant in a weed-free seedbed and to cultivate early and as close to the rows as possible.

After the plants are well established and reach a height of 3 or 4 inches, they grow rapidly and do not need much more cultivation. Shallow cultivation is recommended because the roots grow close to the surface.

Do not throw up a high ridge when cultivating. A wide, flat bed and a narrow water furrow are especially desirable when the crop will be windrowed.

Fertilization

Sesame does not thrive on poor land. An application of a balanced commercial fertilizer at planting time is necessary for good yields on soils of low to moderate fertility. Use application rates similar to those recommended for cotton on



Nonshattering sesame ready for harvest.

BN5717



BN4362

Combining shattering sesame from shocks. (Note platform attachment on which loaders stand.)

the same soil. Apply a side dressing of nitrogen-bearing fertilizer if the plants become unthrifty and light green in color.

Irrigation

Record yields of sesame have been grown in desert areas by using irrigation. Preplanting irrigation is important, but the crop requires only 1 or 2 irrigations during the growing season. Do not use irrigation water that contains a high concentration of salt. Salt concentrations that have little effect on cotton will kill sesame.

HARVESTING

Begin harvesting operations shortly after sesame plants reach maturity. At this stage flowering ceases and most of the leaves shed. Leaves and stems of some varieties turn yellow just prior to this point.

Sesame plants remain green and contain considerable moisture until killed by frost or disease. Oil quality and seed germination, however, are adversely affected by frost.

Each type of sesame—shattering and nonshattering—requires a different harvesting technique.

Harvesting Shattering Sesame

The seed pods of shattering sesame open when dry. Seeds fall out of the pods when the plant stalk is shaken. Extra care in all harvesting operations is important to avoid undue loss of seed. Most seed losses occur before sesame is threshed.

For tall varieties and varieties that tend to "gooseneck," use a row binder similar to the type used for harvesting corn or forage sorghum. Use a small grain binder for the short varieties. Shock the bundles

at once. Keep them small to speed drying. Tie the shocks to keep them from blowing over; tighten the strings in 2 or 3 days.

In 2 or 3 weeks the crop will be ready to thresh. Light rains during the drying period will not seriously damage seed.

Threshing with a grain combine instead of a stationary thresher helps to reduce seed loss. Move the combine from shock to shock.

For threshing shattering sesame, make the space between cylinder and concaves as wide as possible. The cylinder should be set at its slowest speed. Use a seed screen with about $\frac{1}{8}$ -inch round perforations and adjust the air to avoid seed loss.

Remove the screen in the tailings elevator or otherwise divert tailings back to the shaker instead of letting them get back into the cylinder.

Harvesting Nonshattering Sesame

Cut and windrow nonshattering sesame as soon after maturity as

possible. Use a standard windrowing machine for this operation.

When using a small combine, or when the crop is heavy, windrow only 2 rows together. When the crop is light, or a large combine is used, as many as 4 rows may be windrowed together if good drying weather is expected.

Light rainfall during the drying period does not seriously damage sesame. It is important, however, that windrows be placed on the rows and not in the water furrow. Repeated wetting and drying in the windrow will result in some shattering of even the best nonshattering varieties.

When the windrowed plants are dry and brittle, they are ready to be threshed.

Standard pickup attachments, available for all makes of combines, are satisfactory for the threshing operation.

● **Combine adjustments.**—Use low cylinder speeds to prevent seed damage: no more than 500 revolu-



Cutting and windrowing nonshattering sesame.

BN5718



Combining nonshattering sesame from windrow.

M7300

tions per minute for 21-inch cylinders, 580 for 18-inch, or 700 for 15-inch cylinders. If possible use speeds lower than these.

To compensate for the low cylinder speeds, increase the threshing surface to at least double the standard size by increasing the number of concave bars or the number of cylinder bars.

Set the clearance between concave and cylinder at one-eighth inch.

Set the cleaning mechanism to return unthreshed seed capsules by the tailings elevator to the cylinder. Use an adjustable chaffer extension to do this.

When an undershot tailings elevator is used, install a seed screen to prevent threshed seed from re-

turning to the cylinder with the tailings.

The chaffer sieve, chaffer extension, air blast and ground speed of the combine should be set in balance so that neither the sieves nor the tailings elevator becomes overloaded. Use a cleaning sieve with $\frac{5}{32}$ -inch round or slotted perforations.

Inspect the combine while it is running, and seal all openings where seed is being lost.

Do not sacrifice efficient threshing to get clean seed; seed can be cleaned later.

Seed Damage

It is important to keep seed damage to the minimum during threshing. Even slightly damaged

seed lowers the quality of the sesame oil.

Seed damage can be checked in the field by examining 100 seeds thoroughly. If over 20 seeds have visible damage, cylinder speed is too high or threshed seed is returning to the cylinder with the tailings.

DISEASES AND INSECT PESTS

Diseases and insect pests have not caused widespread losses to commercial growers in the past. Insects, however, have caused severe losses in a few isolated cases, and diseases may become serious in areas where humidity and rainfall are high.

Diseases

Some sesame varieties are susceptible to leaf spot diseases. These diseases have not caused serious crop losses in dry areas, but in humid or rainy areas they can become serious.

Other diseases of sesame include fusarium wilt, southern blight, charcoal rot, verticillium wilt, and a leaf and stem blight.

Control.—Use disease-free planting seed. New varieties of sesame are being bred for greater resistance to leaf spot diseases. Ask your county agent about them.

The bacterial leaf spot organism can be eliminated from the seed by soaking the seed for 30 minutes in a water solution containing 250 parts per million of the antibiotic streptomycin.

Insect Pests

Aphids cause the most commonly observed damage to sesame. Thrips will stunt seedlings and injure de-

veloping flower buds so that no pollen is produced and capsules do not set.

Green stink bugs, red spiders, grasshoppers, cutworms, armyworms, and bollworms will also attack sesame but damage is not extensive.

Control.—Use standard commercial insecticides recommended by your county agent for the specific insects that are causing damage. Avoid those containing sulfur since sesame plants are damaged by sulfur. Do not use insecticides just before harvesting the crop.

MARKETING THE CROP

At present sesame is usually sold by marketing contracts arranged between the buyer and the grower before the crop is planted.

As acreage increases, open market sales at harvesttime should become more common.

Since sesame is a new crop, and market grades have not yet been established, each sale of large lots is made on the basis of actual samples from the lots.

Individual growers deliver their seed to market either in bulk or in bags, according to the facilities of the buyer. Sesame is sold by the pound on the basis of clean seed weight. This is determined either by sampling the load to determine dockage for foreign material, or by weighing the load after cleaning.

As acreage increases and volume of seed warrants, it is expected that local oil mills will purchase and process sesame seed produced in their areas. It is also expected that regular trade channels will be developed, and that sesame will be sold on the basis of market grades.